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*An ESSAY on the ART of CONVEYING SECRET and
SWIFT INTELLIGENCE. By RICHARD LOVELL
EDGEWORTH, Esq. F. R. S. and M. R. I. A.*

THE art of conveying intelligence by founds and signals is of the highest antiquity.—It was practised by Theseus in the Argonautic expedition, by Agamemnon at the siege of Troy, and by Mardonius in the time of Xerxes. It is mentioned frequently in Thucydides; it was used by Tamerlane*, who had probably never heard of the black sails of Theseus; by the Moors in Spain, and by the Welch in Britain; by the Irish, and by the Chinese on that famous wall, by which they separated themselves from Tartary.

Read June
27th 1795.

THESEUS furnished his ship Argo with black sails as prophetic mourning for his expected fate; but he promised, that if he were successful he would upon his return put up a white sail to inform his father and his countrymen of his safety. Flushed with victory the young telegrapher forgot his signal. The Athenians

on

* Vertot's Knights of Malta.

on the shore watched with eager eyes for his return; old Ægeus saw the black signal, and certain that his son was dead, he threw himself from a rock into the Ægean sea †.

THE signals of Agamemnon are beautifully described in Æschylus, and every station is pointed out with geographical accuracy.

TAMERLANE's telegraphy was not very refined, but it was sufficiently intelligible. Whenever he laid siege to any town he used to employ three signals—the first day he set up a white flag, to signify that he was disposed to use clemency to those who immediately surrendered; the second day his signal was red, to signify that he would have blood, and that the lives of the governor and of the principal officers of the garrison must pay for their temerity; but the third day his black standard declared that whether the place surrendered or was taken by storm every body should be put to the sword and the town utterly destroyed.

THE Moors built many towers in Spain; they were placed on the principal eminences in the kingdom, from whence, by means of lights and signals, they could correspond with each other. These towers in many places still remain‡. The celebrated

† Perhaps Cervantes recollected the black and white sails of Theseus when he wrote his *Galatea*.

‡ The Asiatics and Arabs practised the art of speaking by signals, as we are told by Hasselquist and Marigni.

brated Mr. Pennant has discovered and traced with great accuracy a long series of stations in Wales from Penbedu to Cop yr Goleuni, or Hill of Fire; these he enumerates in Cambrian orthography, with which I shall not swell this paper.

BOETHIUS says that in his time there still were left in many places in Britain remains of huge poles on which barrels of pitch were elevated to give signals by night and day; and it is said that the custom of lighting fires in Ireland upon St. John's eve is a commemoration of antient signals by fire.

THE description of the wall of China is familiar to us, but it implies ideas of extent and magnitude beyond our habits of comparison, and scarcely within the reach of imagination. We can form no adequate idea of a wall fifteen hundred miles in extent, peopled with centinels who can spread an alarm with the celerity of an electric shock through the nerves of a vast empire.

DIFFERENT methods were used by the antients for the rapid communication of intelligence—by sight and by sound. Smoke by day and fires * by night were the usual signals of particular

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* As the papers of this Academy fall into the hands of the fair sex I must not omit paying due honour to the memory of Hero and Leander. The poem of Musæus is almost forgotten; this will never be the fate of the following beautiful lines of a modern poet:

“ So

events; these signals by degrees were applied to an alphabetical arrangement, which is minutely described by Polybius. The ancients had a much more ingenious contrivance, that contains the principles of all the improvements which have since been made on this subject. The Clepsydra was used like an hour-glass, to count time; it consisted of a tall vessel with a hole at the bottom, through which water passed slowly. The descent of the surface of the water marked the lapse of time: Two similar Clepsydres, with the addition of a floating gauge in each, on which different sentences were inscribed, were set in motion at once by a signal, and were stopped by another signal when the sentence on the floating gauge descended to a certain index. But a still more compendious method of communication was supposed to exist in the 16th century. It was reported that two magnetic dials, with the four-and-twenty letters inscribed on their circumference, would by means of self-moving hands point to the letters which the correspondents meant to indicate. The great Bacon believed in those sympathetic dials, and the learned

“ So on her sea-girt tower fair Hero stood
 “ At parting day, and marked the dashing flood;
 “ While high in air the glimmering rocks above,
 “ Shone the bright lamp, the pilot star of love—
 “ With robe outspread the wavering flame behind
 “ She kneels, and guards it from the shifting wind;
 “ Breathes to her goddess all her vows, and guides
 “ Her bold Leander o’er the dusky tides.”

DR. DARWIN’S Botanic Garden.

learned Sir Thomas Browne, in his enquiry concerning vulgar errors*, gravely informs us that he procured two dial plates, according to directions, magnetised the needles, and repeated the experiment in form, but to his infinite disappointment, “ the needles, though but a span removed from each other, stood like the pillars of Hercules :” He then proceeds to confute the theory “ of this excellent (and if the effect would but follow) divine conceit,” by shewing that magnetic needles should influence the motions of each other, not in the same, but in contrary directions; had this been the only difficulty, it had been easily obviated by reversing the order of the letters in one of the alphabets.

DoCTOR Johnson, in his life of Browne, laughs at him for having taken the pains to try “ such a hopeless experiment,” remarking “ that he might have satisfied himself by a method less operose, by thrusting two needles through a cork and setting them afloat in two basins of water ;” but Browne, he observes, “ appears indeed to have been ready to pay labour for truth.”

THE story of these dials had, I believe, some foundation, but, as it usually happens in popular stories, much fiction has been mingled with some truth.

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* Book 2d, page 57.

IF two clocks were furnished with hands, and with dial-plates containing the alphabet, the motion of each of them might be unlocked at a momentary flash or sound, and they might be stopped together at any letter by a second explosion. I am informed that a very ingenious member of this Academy has spoken of such a contrivance*—With proper precautions, and by substituting numbers corresponding with a vocabulary instead of an alphabet, this invention may be perfected. I cannot help remarking, that by the experiment of Sir T. Browne with two distinct dials, &c. a hint might have been obtained of a practicable contrivance; but by Doctor Johnson's cork, with two needles thrust through it, nothing could be obtained but disappointment. Vulgar tradition and poetic allegory are neither to be implicitly trusted nor hastily despised†. The incredulity of mankind in some instances appears as surprising as their credulity in others. The disposition to ridicule every scientific project as absurd until it has been absolutely brought to perfection has been the common topic of complaint amongst men of inventive genius; and it is curious to observe that poets, who suffer so much themselves by the taunts of men of the world, and by the apathy of the vulgar, should in their turn revenge themselves

* A similar contrivance is mentioned in Hooper's Rational Recreations.

† In a beautiful Arabian tale, written perhaps a hundred years before the time of Galileo, in which we expect nothing but fiction and extravagance, we find that the air balloon and the telescope are introduced in the contrivance of the fable.

felves upon men of science, and treat their speculations with disdain. Ben Johnson has attempted this in one of his masques with a degree of humour which is not always the portion of those who throw ridicule on science. Merefool, the clown of the piece, consults an adept, who promises to instruct him in all occult secrets, and to shew him apparitions of all the learned men of the ancients; but every man who is called for happens to be busy, from Pythagoras “who has rashly run himself upon “an employment of keeping asses from a field of beans,” to Archimedes, who is meditating the invention of

“ A rare mouse trap with owls wings,
 “ And a cat’s foot to catch the mice alone.”

Not only the same taste for ridicule, but the same ideas we find repeated, with a slight alteration, at different æras; Aristophanes and Lucian amongst the ancients*, and Butler†, Swift

* A balloon may be carried forward with certainty and celerity in any direction where there is no perceptible wind, if it is alternately lowered and elevated by altering from time to time its specific gravity, which may be done by various means without losing much hydrogen gas; and if it be furnished with fins or small sails and be set to a proper angle with its line of ascent and descent, their vertical pressure against the air will impel the balloon forward.

Swift manœuvres his Laputa in this manner.

I tried this invention on a small balloon in the house of the late ingenious Dr. Usher, the friend of science, and of those who wished to improve it.

† See Butler’s ridicule of the ingenious idea of making use of pendulums for a universal measure. Canto 3d, page 87.

Swift and Voltaire, the three great modern masters of ridicule, have in various shapes the same ideas, and are alike disposed to confound the ingenious and the extravagant. The best way of parrying the stroke of ridicule is to receive it with good humour; laugh with those who laugh, and persevere with those who labour, should be the motto of men who possess the powers of invention.

THE late Doctor Johnson, who in his *Rasselas* ridiculed the idea of the art of flying, lived long enough to see the ascent of the first air balloon.

SEVERAL attempts have been made to convey ideas by sounds louder than the human voice. Even the voice of Stentor was insufficient to reach a whole army, and the speaking trumpet* was invented to convey the orders of the general in the field of battle. It is mentioned in Æschylus; and Alexander is said to have possessed a trumpet of such astonishing powers as to convey his commands to the distance of one hundred stadia, nearly twelve miles.

THOSE who wish to turn their attention to the improvement of speaking trumpets, of tubes, or of buildings for magnifying sound,

* Sir T. Morland and Kircher disputed long and loudly their respective claims to the invention of the speaking trumpet. It is singular that the latter should forget the stentorophonic tube of Alexander, the figure of which is preserved in the Vatican.

found, will be pleased with an ingenious memoir of Beaurmur's in the Academy of Sciences †. “ Sur le son que rend le plomb en quelques circonstances,” with the observations of Monf. Sauveur‡. The memoir of Maupertius § upon musical instruments—An excellent set of experiments by M. L'Ablé Nollèt||, “ Sur la transmission des sons dans l'eau ;” and a short letter amongst the miscellaneous papers of the judicious Franklin, will probably be found useful.—Nor will any man of genius neglect the enthusiastic predictions of our great philosopher Doctor Hooke*. In his method of improving Natural Philosophy he speaks of the instruments which may be contrived to enlarge the powers of our senses. He subjoins to what he says on the sense of hearing the following apology :

“ METHINKS I can hardly forbear to blush when I consider
 “ how most people will look upon this, but yet again I have
 “ this encouragement, though these things be never so much
 “ derided by the generality of men, and never so seemingly mad,
 “ foolish, or phantastical, that as the thinking them impossible can-
 “ not much improve my knowledge, so the believing them pos-
 “ sible may perhaps be an occasion of my taking notice of such
 “ things as another would pass by as useless.”

THIS is not enthusiasm, but sound sense ;—men of enlarged minds admit universal toleration for conjecture and theories, be-
 cause

† M. 1726, page 243. 464.

‡ Histoire 1701, page 25.

§ Memoires 1724, page 215.

|| Memoires 1741, page 199.

* Doctor Hooke's Posthumous Works.

cause they consider them as the means of rousing activity, and of exciting to experiment and patient observation. A man who has a theory to support must concentrate his attention, and will quit the idleness of mere ingenuity for that industry which leads to truth—assertions and declamation he knows will avail him little; facts, which ultimately decide all arguments, must be ranged under his banners, if he aspire to the honours of a triumph; nor is it by any means necessary that the spectators should be partizans; the most complete indifference may be preserved as to the theorist, and even as to the theory.

I THOUGHT it necessary to mention the attempts which have been made to communicate intelligence swiftly by sound, and to remark that it is probable that this art may be brought in time to high perfection. Though I prefer different methods I would not discourage others, nor keep my own mind so intent upon one object as to prevent my observing what may be worth my consideration in another.

THE telegraphic art was chiefly confined to war amongst the ancients; but we have reason to conjecture that it was also secretly employed in the management of oracles. Fontenelle believed that the oracles at Delphi and at other places were delivered through pipes, which communicated with the apartments of the priests*. Besides contrivances of this sort, is it absurd to suppose

* Père Balthus opposes this opinion of Fontenelle's in his answer to the History of Oracles.

suppose that they possessed some secret mode of receiving intelligence from the several nations who consulted them ?

CROESUS, after having been duped by various oracles began to suspect their infallibility, and to observe that they made bad verses; he resolved to try their powers of divination before he put himself to any farther expense in costly offerings. At a certain hour, on a particular day and at an appointed moment, the messengers whom he had dispatched to the different oracles demanded from them “ What was at that instant the employment
“ of Cræsus ?* ”

ALL the oracles were mute, except the Delphic, which immediately answered the messengers of Cræsus in these *inspired* lines †.

“ I know the space of sea—the number of the sand,
“ I hear the silent—mute I understand.
“ A tender lamb, joined with tortoise flesh,
“ Thy master, king of Lydia, now does dress;
“ The scent thereof doth in my nostrils hover,
“ From brazen pot closed with brazen cover.”

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THIS

* Herodotus, 1st vol.

† I have preferred this translation to all others, as best suited to the oracle.

THIS was precisely the strange employment which the king had privately devised for himself. The answer of the oracle astounded and convinced Cræsus, and seems to have had as powerful an effect upon Sir Thomas Browne, who in his “ Enquiry concerning Vulgar Errors,” calls this the plainest of all oracles, and deems it the clearest proof of their supernatural agency. Neither probability nor coincidence could have produced this marvellous reply; it has therefore excited alike the astonishment of the learned and of the ignorant. But the wonder ceases, and an easy solution of the difficulty presents itself, if we suppose that the priests of the oracle were Telegraphers.

It is probable that signals were first employed for defence to give notice of an approaching enemy. The stupendous wall of China does not appear to have been intended for a barrier against the Tartars as a nation; it was probably meant as a defence against their occasional inroads as banditti. To embodied enemies it would have presented no insurmountable obstacle, but against detached marauders it was an effectual fence. Gibbon seems not to have perceived the real intention of this laborious work; he speaks of it consequently with too little respect when he affirms that “ it has never contributed to the safety of an unwarlike people.” It is true that their savage enemies have upon some occasions, “ by their rapid impetuosity, surprised, astonished and disconcerted the grave and elaborate tactics of a Chinese army.” But war was never the taste or business of
this

this automatic nation ; furrounded by hordes of banditti, their wish was uniformly to préserve the methodical regularity of peace. It will be allowed that it was no easy task to make their circumstances and their taste agree ; yet they have quietly gained their point, and they have lived the same life for thousands of years. Their dynasties have changed, but the nation has remained the same.

THE existence of their empire is the best proof of its policy, and the best argument to demonstrate that art and science, if we take time into the account, are able to conquer force and numbers—if we take time into the account ; for many of the mistakes in our reasonings, and in the conclusions that we draw from experiments, in moral as well as in natural philosophy, have arisen from our omitting *time* in our calculations.

It was the policy of the Romans, which secured to them the dominion of all the countries which they conquered, to establish wherever they went methods of communication and swift intelligence. Their laborious roads, their forts, their military observatories, are all proofs of their consummate skill in the arts of government and of war. It is not necessary to expatiate upon facts with which every person of literature is acquainted. The remains of these public works may easily be traced. Amongst many others the lofty towers which are to be seen at Uzès, Bellegarde, Arles, and an antient building called “ The Tourmagne ” at

Nîmes *, were Roman watch towers, from which the Roman guards communicated intelligence to each other by signals, of whatever passed in the surrounding country. The advantages of this universal facility of intercourse through a vast extent of empire, divided by nature, and united more by art than arms, were peculiarly felt. The capitals of Syria, Egypt, Antioch, and Alexandria, with a croud of dependent cities, eleven hundred and ninety-seven in Italy, twelve hundred in Gaul, three hundred and sixty in Spain, three hundred African, and five hundred populous Asiatic cities “ swell the astonishing list of these dominions.” All these cities were connected with each other, and the great chain of communication from the north-west to the south-east point of the empire was drawn out to the length of about 3740 English miles. “ † It was the advantage of receiving the earliest intelligence and of conveying their orders with celerity, which induced the emperors to establish throughout their extensive dominions the regular institution of posts.”

It is not from any pedantic reverence for antiquity that I appeal to precedents. Precedent, either antient or modern, is listened to by men of sense only as being the voice of experience, not from its assuming the tone of authority. The legislation and manners of the modern world differ so much from those of the antient, that it would in many cases be absurd to apply their maxims to our situations; and notwithstanding the great undertakings

* Antiquities de Nîmes. † Gibbon, vol. 1st, p. 60.

takings of the antients, the modern improvements of science give us evident superiority in several of the arts of life and of defence.

SCIENCE is no longer recluse, no longer enveloped in mystery, or ambitious only of idle admiration ; she has discovered that to be esteemed by men she must be useful.

IN the present times as in the past the power of executive government in every state must in a great measure depend upon the celerity and accuracy of its intelligence : “ First to watch “ and then to speed,” is one of Lord Bacon’s political maxims ; he advises to “ commit the beginning of affairs to Argus with “ his hundred eyes, and the end to Briareus with his hundred “ hands.” The hands that can execute are in every state more easily found than the eyes that can observe.

WHILST government is uncertain from what quarter an attack may come, or in what part of the country commotions may suddenly arise, the means of assistance must be immediately at hand in various parts ; nor whilst information is tardy or imperfect can the force be proportioned to the danger ; there is perpetual hazard of profusion or neglect. But, on the contrary, if from day to day and from hour to hour intelligence could be received from all parts of a country, there would be time for combination and arrangement ; the force of a kingdom could be collected by a wish and directed by a word. The certainty which the people would

would have of the immediate superintendence of their governors would create confidence in the good, and apprehension in those who are disposed to mischief. It is not the severity and the duration of punishment, but its certainty and its immediate connection with the crime, which act most forcibly upon the human mind. No means can be more likely to prevent disobedience to the laws, either civil or military, than those which increase the probability of speedy detection. What man would attempt to fly from the civil power who knew that his flight would be advertized through the kingdom in a few minutes, and that the description of his person with the publication of his offence would infallibly meet him wherever he went? With such advantages government would not be obliged to keep an extravagant force in display to create respect.

WHOEVER attends to secret histories and private memoirs, from "The diary of Bob Dodington" to the shameless "Secret History of the Court of Berlin," will be convinced of the anxiety of courts and courtiers for early intelligence. Mirabeau paints in strong colours his anxiety to give his employers at the French court the *earliest intelligence* of the death of the king of Prussia. His own perplexity, and the bustle amongst rival courtiers and ambassadors, are well described:—the consequence of carrier-pigeons and couriers, and the expense which Mirabeau was commissioned to defray, shew the value which the court of Versailles annexed to his success*.

As

* Mirabeau's Secret History of the Court of Berlin, Page 50.

As this is not a memorial for ministers, but a paper addressed to a philosophical society, I may without impropriety remark, that he “ who smote the house of Bourbon with one hand, “ and in the other wielded the democracy of England,” was supposed to have had the best intelligence of any minister that ever presided over the British councils. It was this circumstance which gave a secret power to his eloquence over the minds of those who knew that his prophetic strain was the language of political experience, not of ignorant enthusiasm. His words, in a speech on the commencement of hostilities with Spain, were remarkable.

“ I do now pledge myself to this honourable house for the “ truth of what I am going to assert—that at this very hour “ that we are sitting here together, there has been a blow of “ hostility struck against us by our old inveterate enemies in “ some part of the world.”

THIS prediction, if it was a prediction, was almost immediately verified; the next post brought news, that the blow of hostility had been struck at Falkland's Islands.

THE advantages which by means of Telegraphy would result to commerce must, both in time of war and peace, be extensive. In time of war the safety, I might almost say the existence, of the commercial world, depends upon the rapidity and the accuracy of its intelligence. The relative success of
merchants,

merchants in their several ventures and speculations must be regulated by the extent of their information, and by their capacity to apply that information to their conduct. To equalize their capacity is impossible; there will always remain a considerable difference between the understandings of men, supposing them to be in possession of the same facts; but, to those who can reason, the great difficulty is to arrive at facts that may form just data for their reasoning. Here I flatter myself Telegraphy can materially serve them, nor will they be inclined to treat with disdain any attempt of science to abridge the routine of business.

It is curious and sometimes amusing to observe how any new invention implicates different interests, and how different classes of society are immediately or remotely affected by circumstances in which they did not imagine themselves to be in any way concerned. A stock-jobber, in glancing his eye down a column of a newspaper, would skip over a paragraph about a Telegraph, as news from the regions of science, in which he could have no manner of interest. Science and stock-jobbing do not indeed appear to bear any near affinity to each other, nor should we expect that a mechanic invention would have any powerful effect upon the rate of insurance; yet the establishment of Telegraphs in proper places would produce a great revolution at Lloyd's and on the Exchange.

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THE profits of insurers, which do not depend on gambling but on calculation, would be raised, not in the immediate increased rate of insurance but in the certainty of the revenue. In proportion as their intelligence was expeditious and authentic they could afford to insure on lower terms, because their business would become more extensive, and because the hazards arising from ignorance of foreign and domestic events would, to them, be considerably diminished.

I AM sensible that the gambling stock-jobber, and all those concerned in the insurance of lotteries, ought, if they understood their own interest, to consider this invention as the ruin of their trade. Whatever brings the conduct of affairs within the limits of calculation, and enlarges the power of prudence, diminishes the empire of fortune, and must be deprecated by gamesters of every description. A stock-jobber traffics in the ignorance and credulity of his neighbour, against which he stakes his own information and cunning, and sometimes his rashness and presumption. His business is to collect intelligence, and to conceal or divulge it as may suit his interest. He lives by the news of the day and by the report of the moment; but since news, even with all the activity he can employ, cannot be circulated from kingdom to kingdom, through the streets of London, the coffee-houses and the exchange, with the same velocity by the human tongue as by the Telegraph, he will hate and fear it as his rival and detector; nor will any man of bu-

ness, any philosopher, nor yet any honest man, feel the slightest compunction at the idea of destroying the profits of a class of speculators unproductive to the wealth and noxious to the morality of the community.

It has been observed by Smith, that mankind are wonderfully disposed to trust to their individual good fortune, contrary to the general experience of human affairs. This propensity has lately been apparent in the commercial world, and it would be in no small degree serviceable to its interests to bring back the attention of the merchant from chance to industry.

To give an instance of the effects that might be produced by immediate and universal communication in the affairs of commerce I need only mention the corn trade. The advantage of the weekly corn returns from different parts of England have been sensibly felt; and if such returns would be daily made combinations would be prevented in every market in the kingdom.

THE celebrated author of "The Wealth of Nations" has so clearly developed the connexion between freedom of intercourse in society and the interests of commerce, between the facility of communication in kingdoms, and the demand for the necessaries, or the taste for the luxuries of life, that it would be impertinent to repeat observations which he has impressed upon the public conviction,

conviction, or to explain what he has demonstrated. But the facts which he has with so much accuracy and elegance arranged in systematic order have been remarked in detail by others in the common business of life, for on these common observations compared and arranged all systems that are just must be founded.

EVERY person must have observed the effect which quick and easy communication between the parts of a country has upon its prosperity. With the faculty of gratifying our taste for the conveniences of life the taste itself increases, and whatever facilitates the means of giving *orders* increases the productions of industry.

By this freedom of intercourse, as both expense and time are saved, the conveniences, comforts and innocent luxuries of life are brought within the limits and reach of our prudence. Telegraphy we may flatter ourselves will extend these limits, and “ will bring our wishes nearer to our view*.”

THERE is no reason to doubt that such a communication will exist between the different parts of the European continent and

* P 2

Great

* Puck promises Oberon to put a girdle round the earth in forty minutes. It is not physically impossible (I do not speak of probability) to send a message from the extremity of Siberia to Cape Horn and to receive an answer in twenty minutes.— a time and space nearly equal to the fiction of Shakespeare

Great Britain when peace shall be established*. The general advantage of an immediate and speedy communication between this country and Great Britain are sufficiently obvious, both with respect to their unity of interest and their commercial intercourse. Our legislation and manners are the same with those of the English, and all means which contribute to unite the minds and interests of the people must be advantageous to both nations.

At present an express cannot reach London from Dublin in less than forty hours. By the Telegraph a message may be conveyed in as many minutes. At the same rate a correspondence may be maintained with Cork with the sea ports of Great Britain, and with any place where such communication may be required.

I SHOULD not omit to point out to this learned and patriotic Academy the uses to which the Telegraph may be applied in the pursuits of science. One of our members, as highly distinguished by his taste and love for literature, as by his munificence, proposed to the late Dr. Usher the measurement of a base in Ireland for the construction of a series of triangles, to be connected with the operations of General Roy in Great Britain and France. The Doctor did me the honour to associate me in this undertaking ;

* I scarcely dare to foretel that a communication by Telegraphs between Europe and the East Indies will one day be established, and that its effects will be more beneficial to Europe than monopoly or conquest.

taking; and the last lines, which I believe he ever wrote, were upon this subject. In a philosophical enterprise of this extent, as General Roy has feelingly remarked, there are more difficulties to be overcome, and more expedients required, than could be easily foreseen. Three summers were consumed in operations that it was supposed would have been accomplished in two or three months; and a great part of this delay arose from the necessity of keeping up constant communications with distant observers. If the Telegraph were employed in such a survey the business might be conducted with ease and satisfaction; the irksome interruptions arising from the distance of stations would be avoided, and every step would be progressive.

THE science of meteorology, which has lately been cultivated with so much good sense by Mr. Kirwan, might receive great assistance from the Telegraph, when established in the principal parts of this kingdom and of Great Britain: A communication swifter than the wind would prepare the attention to observe those phenomena in different places, which are supposed to precede storms and fair weather. The manometer in particular might be corrected from the comparison between distant observations made at the same moment.

WHENEVER the aerostatic balloon is employed for the purposes of science, the power of communication between the clouds and the earth, between different balloons at various heights and
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in various places by Telegraphy, will tend to improve our knowledge in many parts of science. Public curiosity and private gain have been amply satisfied by various aerostatic exhibitions. Balloons will, I hope, soon become an object of different speculation; and at some place distant from the capital and from any large city, they will I hope be employed at leisure to enlarge our knowledge of the atmosphere, of dioptrics, acoustics, pneumatick chemistry, and of the animal œconomy, so far as it is effected by the different pressure and different qualities of the higher regions of the atmosphere.

THERE is another important scientific use to which Telegraphy may be applied—it may serve as an introduction to an universal language.

THE idea of a universal character and philosophical language, which all nations should be able to write and understand, has been treated by many as chimerical, because it has not yet been brought to perfection. The Jesuits, by the accounts their missionaries sent home of the peculiarities of the Chinese language, fixed the attention of men of learning and ingenuity upon this subject. The defects and singularities of that language afforded them ample matter for reflection. The Chinese have no alphabet of simple sounds like ours; no elementary characters like our letters, from the combination of which European languages are formed. They have two separate

rate languages, one oral, to serve for the common purposes and business of life, consisting of about three hundred words; the other, which is reserved for the use of the literati, for history, poetry and science, comprises sixty thousand or eighty thousand * different characters. As they have no alphabet, each distinct idea and each variation of a thought, instead of being expressed by the different arrangement of the same letters, must be denoted by a separate character or an appropriate inflexion. The labour of learning these is the labour of a life. Scarcely any of their manderines pretend to understand the whole of the language, and a manderine who at fifty can boast that he knows half his characters is accounted in China a very learned man. Their popular language has likewise a defect which we should think must be every day felt by all classes of people. Each of its three hundred words, when pronounced in different tones, expresses totally different things; and the slightest inflexion of the voice entirely alters a man's meaning; so that those who have the misfortune to have a bad ear must consequently, in China, have a bad understanding. The syllable *Ko* has ten different modes of pronunciation; and *Ba*, according to its various accents, has six several senses, which bear no affinity to each other. The most expert orators in the nation often find it impossible to make themselves understood without several attempts and repetitions to explain themselves; and sometimes they

* Du Halde.

they are forced to conclude by † making the figure of the character they would express with their fingers in the air or upon a wall or table.

WITH such orators action is every thing ! To make the affairs still more complicate, the different provinces of China speak different dialects, incomprehensible to each other ; but they have one common written character which all the provinces and also the Japanese understand and can read off in their several tones into their respective languages—this shews the possibility of a universal character being brought into actual use.

BISHOP Wilkins, in his “ Essay towards a Universal Character,” as he modestly calls it, has displayed wonderful ingenuity and a most comprehensive mind. His characters are formed on principles of philosophic arrangement, so that the sight of any character designed to denote a complex idea shall by different lines or points represent or bring to our recollection all the several parts of which that idea is composed. Those characters which denote substances or animals express by slight differences at once the species and genera to which they belong. This idea of classification he traced in a few instances in the Chinese language. The Chinese character, that signifies metals, with slight additions, distinguishes

† Wilkins.

tinguishes iron, copper, steel, &c.*; and the character used for a precious stone, with certain variations, means different kinds of gems or pearls. Independently of his general system his remarks upon conjunctions and particles are excellent for his time, though a late ingenious publication † has shewn the mistaken principles upon which he and all former grammarians had reasoned upon the subject. Doctor Wilkins's characters for irony, and to give warning that a word is used in a figurative or rhetorical sense, might be used with as great advantage as the common notes of interrogation and admiration. The warning note might not be approved of by poets, wits and orators, because it would lessen the effect of repartee, declamation, and perhaps of the sublime, which requires some degree of obscurity to captivate the imagination, or of surprize to astonish the understanding: But where accurate knowledge, rather than amusement, is required, such an assistance would be agreeable. Those who have turned their thoughts towards education will immediately perceive its utility in another point of view. By the help of this note children would understand part of the poetry which they are *obliged* to learn by heart.

It is not possible to explain Wilkins's system in a few words: Allowing for the phraseology of his time his copious folio is scarcely too large to do justice to his ideas.

VOL. VI.

* Q

WHEN

* See an ingenious Essay on Symbols and on Characters used by Chemists; by Dr. M. Wall.—Mem. of Phil. Soc. Manchester, 1st vol.

† ΕΠΕΑ ΠΤΕΡΟΕΝΤΑ.

WHEN I was arranging a vocabulary for the telegraph, I looked over his work, and recalled to my mind ideas upon the same subject, which have for years, at intervals, employed my attention.

It has employed the talents and attention of several men of learning and ability, and it appears to be a subject worthy of their time and labour, and highly inviting to future industry and invention.

FONTENELLE, in his Eloge on Leibnitz, mentions his intention of making out an alphabet of human thoughts, for a philosophical language; but his death put a stop to the design. This intention I have found obscurely mentioned at the end of his ingenious Memoire on Binary Arithmetic, where he speaks of “a new character,” which he projects—A translation, perhaps, might not do justice to the meaning, I therefore will quote his words :

“ C’est que tout raisonnement qu’on peut tirer des notions
 “ pourroit etre tiré de leur caractères, par une maniere de calcul
 “ qui feroit un des plus importants moyens d’aider l’esprit
 “ humain*.”

M. LEIBNITZ told Boyle, “ that though Wilkins and Dalgarnie were great men, he did not think they had hit their
 “ point.

* Memoires de l’Academie de Science, 1703. m. page 111.

“ point. They might,” he said “ by means of their languages, “ enable nations who were strangers to each other to converse “ together, but they had not caught the true real characters, which,” he said, “ should resemble algebraic characters, which would in- “ finitely assist the memory and invention.” If Leibnitz could have found these real characters, the greatest difficulty, as Fontenelle observes, would have still remained, to have persuaded mankind to agree in the use of them.

LAVOISIER, who invented, on truly ingenious and philosophical principles, a new language for chemistry, found it for some time difficult to introduce it amongst chemists; and the characters which, with the approbation of the Academy of Sciences, Monf. Berthollet has annexed to Lavoisier’s vocabulary, have never been adopted in the scientific world.

THE aversion which the learned, as well as the vulgar, have shewn to adopt any universal language that has ever yet been proposed to them, arises from various causes. The peculiar associations and habits of different persons are incompatible, so that an arrangement of sounds or ideas, which may be convenient to the memory of one person appears preposterous to the judgment of another; and the analogies which strike the understanding of one class of people are so foreign to the minds of another that they tend rather to bewilder and disgust than

to please and assist the imagination. Besides this there is a difficulty which arises from the vanity of each individual, who fancies that in a new coinage of language his own authority would be sufficient to give credit and currency to any new words he wished to bring into circulation.

THE press is an engine which every person can make use of to convey his ideas to the public, and as long as any objection can be made to the introduction of new characters it is not probable that they should be admitted, because every person is confirmed by habit, vanity or immediate convenience, in the use of the established mode of expression. But when a man wishes to convey his ideas to foreigners who do not understand his language, or whose language he does not understand, he trusts with confidence to his interpreter, and is content to catch, at second hand, some knowledge of the terms which are employed in his service—he submits from necessity to what he would not stoop by choice. When all competition ceases men are willing to learn voluntarily what they would never have condescended to be taught by compulsion.

IN this point of view it appears to me that the Telegraph would be an easy and certain means of introducing a universal language, and of improving it by degrees without any extraordinary effort. The object would be accomplished before it was suspected, and it would be subject to less opposition when presented

presented as an incidental than when introduced as a primary consideration. At present I shall not attempt to enter upon such an extensive enquiry as into the means of forming an universal language, but at some future period I hope to offer my thoughts upon this subject to the Royal Irish Academy.

HAVING slightly mentioned the contrivances made use of by the antients for conveying intelligence swiftly, and having pointed out some of the various important uses to which this art may be applied, I shall endeavour to give a clear view of my attempts on this subject.

MODELS of the French Telegraph have been so often exhibited, and the machine itself is so well known, that it is not necessary to describe it minutely in this place.—It is sufficient to say that it consists of a tall pole, with three moveable arms, which may be seen at a considerable distance through telescopes; these arms may be set in as many different positions as are requisite to express all the letters of the alphabet:—By a successive combination of letters shewn in this manner words and sentences are formed and intelligence communicated. No doubt can be made of the utility of this machine, as it has been applied to the most important purposes. It is obviously liable to mistakes, from the number of changes requisite for each word, and from the velocity with which it must be moved to convey intelligence with any tolerable expedition.

THE

THE name, however, which is well chosen, has become so familiar, that I shall, with a slight alteration, adopt it for the apparatus which I am going to describe. *Telegraph* is a proper name for a machine which describes at a distance. *Telelograph*, or contractedly *Tellograph*, is a proper name for a machine that describes *words* at a distance.

DOCTOR Hooke, to whom every mechanic philosopher must recur, has written an essay upon the subject of conveying swift intelligence, in which he proposes to use large wooden letters in succession. The siege of Vienna turned his attention to the business. This method is more cumbrous than the French Telegraph, but far less liable to error.

I TRIED it before I had seen Hooke's work in the year 1767 in London, and I could distinctly read letters illuminated with lamps in Hamstead church yard, from the house of Mr. Elers in Great Russell-street, Bloomsbury, to whom I refer for the date and circumstance—To him and to Mr. E. Delaval, F. R. S. to Mr. Perrot of Harehatch, and to Mr. Woulfe the chemist, I refer for the precedence, which I claim in this invention. In that year I invented the idea of my present Tellograph, proposing to make use of wind-mill sails instead of the hands or pointers, which I now employ. Mr. Perrot was so good as to accompany me more than once to a hill near his house to observe with a telescope the windmill at Nettlebed, which places are, I think,
fixteen

fixteen miles afunder. My intention at that time was to contrive not only a swift but an unsuspected mode of intelligence : By means of common windmills this might have been effected, before an account of the French Telegraph was made public *.

My machinery consists of four triangular pointers or hands, each of which points like the hands of a clock to different situations in the circles which they describe.

It is easy to distinguish whether a hand moving vertically points perpendicularly downwards or upwards, horizontally to the right or left, or to any of the four intermediate situations.

THE

* Since this paper was written, I received a letter from Mr. Perrot, which has been seen by the President, containing the following passage :

“ I perfectly recollect having several conversations with you in 1767, on the
 “ subject of a speedy and secret conveyance of intelligence ; I recollect our going up
 “ the hills to see how far, and how distinctly, the arms (and the position of them)
 “ of Nettlebed windmill were to be discovered with ease. As to the experiments
 “ from High-gate to London by means of lamps, I was not present at the time,
 “ but I remember your mentioning the circumstance to me, I believe in the same
 “ year. All these particulars were brought very strongly to my memory when the
 “ French a few years ago conveyed intelligence by signals ; and I then thought and
 “ declared, that the merit of the invention undoubtedly belonged to you.—I am very
 “ glad that I have it in my power to send you this confirmation, because I imagine
 “ there is no other person now living who can witness your observations in Berk-
 “ shire.

THE eye can easily perceive the eight different positions in which one of the pointers is represented, plate II. fig. 1. by turning the eye to the circle A.

A SIMILAR circle may be imagined round each of the pointers, by which the numbers which they are intended to express may be discovered with much facility.

OF these eight positions seven only are employed to denote figures, the upright position of the hand or pointer being reserved to represent O or Zero. The figures thus denoted refer to a vocabulary, in which all the words are numbered. Of the four pointers, plate I. that which appears to the left hand of the observer represents thousands, the others hundreds, tens and units, in succession, as in common numeration.

* IN the annexed plate the four large pointers stand at 2774, which in the common arrangement of my vocabulary denotes the

* I insert, plate II, fig. 2, a line described by telegraphs as an example.—It is the first line of the following verses written on the prospect of corresponding between England and Ireland by the Telegraph :

Hark from Basaltic rocks and giant walls,
To Britain's shores the glad Hibernia calls;
Her voice no longer waits retarding tides,
The meeting coasts no more the sea divides.
Quick, at the voice of fortune or of fame,
Kindles from shore to shore the patriot flame,
Hov'ring in air, each kindred genius smiles,
And binds with closer bands the sister Isles.

The numbers are, 2645, 2331, 573, 1113, 244, 2411, 6336.

the Royal Irish Academy. For permanent stations, which may be seen clearly with tolerable glasses at twenty miles distance, stone or wooden pillars sixteen or twenty feet high must be solidly erected; on the top of these a moveable circle or platform turns horizontally upon a centre:—on this platform an axis moves vertically and carries the arm or pointer along with it. Eight handles turn the pointers, which are fixed in their different positions by a catch or alidad. By means of the platform the pointer may be turned to any part of the compass, and as one side of it is painted black and the other white, either side may be employed, as the colour of the clouds or the situation of the place may require.

BESIDES these permanent machines, of which dimensions and a description are subjoined, Plate I. I make use of portable machines, (which may be detached like Tentacula from the main body in hazy weather) consisting of pointers ten or twelve feet high, and of a light triangular stand, which can be easily fastened with tent pegs to the ground: These may be lodged in any house near the place where they are used, or in times of danger may be carried back to the permanent stations every night.

IN managing a correspondence by these machines, it is necessary to have certain signals established; nor are these signals merely arbitrary; it is absolutely necessary that they should be

made by the two external or by the two internal pointers, else they could not be repeated by the intermediate stations without confusion, because in the middle stations that pointer which represents thousands, when conveying a message eastward, for instance, must, when an answer is returned in an opposite direction, represent units; the same change will take place between the pointers that denote hundreds and tens.

CERTAIN hours of the day must be appointed for ordinary communication. Suppose ten o'clock in the morning and five in the afternoon in Summer. Every communication begins from the capital. If no intelligence is required to be conveyed from thence the word BEGIN is sent to the country station, which may then proceed or dismiss the meeting.

WHEN any communication is to be commenced, the pointers that denote thousands and units are whirled round till the same is done at the corresponding station. When this signal has been answered, the person who gave it proceeds to send his intelligence. As soon as he begins, the pointer of hundreds at the opposite station is turned to Two, and kept in that position till the word is made out from the vocabulary; it is then turned up to O or ZERO. The person who is speaking, when he perceives by this signal that he is understood, turns all the machines to NOUGHT, which is always to be done at the conclusion of every word.

WHEN

WHEN all his machines are in this position his correspondent again turns his pointer belonging to the place of hundreds to Two, where it is to remain till he receives another word, and so on till all that is meant to be said is finished. To denote that his communication is finished † THOUSANDS and UNITS are to be vibrated backwards and forwards, with the point downwards like a pendulum, till the same is done at the opposite station.

IF any interruption takes place on either side from a cloud, a shower or any accident, it is pointed out by vibrating THOUSANDS and UNITS, with their points upwards, which signal must be repeated from the opposite station. Whoever has made the signal of interruption must make a signal of recommencement, when he is ready to proceed, by vibrating HUNDREDS and TENS with their points upwards; when this is answered (but not before) the business may proceed. It should be observed in general that every signal should be answered.

IT requires some steadiness to abide by these signals, but if they are patiently adhered to the success that they ensure will soon convince the operator of their utility. Without them every thing would be in confusion; by their interposition perspicuity and order are perfectly insured.

R 2

IN

† I use the words Thousands and Units here and in the rest of this description for the pointers or machines that stand in the numerical place of thousands and units.

IN my first experiments the impatience of friends, who were present, was sometimes so great as to make it very difficult to adhere to previous arrangements; but a very little practice (I mean the practice of five or six days) reduced the routine of communication to as much facility as could be desired, so that a word (or a sentence if contained in the vocabulary) could be sent in twenty seconds.

ANY person who has the slightest taste for science or literature must be struck when he sees instantaneous interpretation of signals, which are made at the distance of fifteen or twenty miles, and when he perceives the power which is obtained of transmitting thought with such astonishing rapidity.

I SHALL not enter into a detail of the signals which are necessary for intermediate stations; it would take up some time to explain them, and they will readily occur from what has been said already.

WHAT I have hitherto described relates to a large and permanent establishment†, for the management of which one man is required at each pointer, one at the telescope and another at the vocabulary; but for ordinary purposes a single pointer with

† The House belonging to this establishment might be made tenable against a mob or musketry at a small expense by port-flankers of elm or ash, adapted occasionally to the windows. See Plate I. Fig. 4.

with one man to work it, and another at the telescope with a smaller vocabulary, are sufficient. With this reduced apparatus we can with ease speak at the rate of one word per minute to a great distance, as the time lost by intermediate stations is but small.

THE vocabulary corresponding with the numbers denoted by this machinery is composed of a large book with mahogany covers, framed, to prevent them from warping. Its size is 47 inches by 21. It consists of 49 double pages, that is to say, each sheet is folded in the middle, where it opens from one page.

THE book is divided into seven parts, consisting each of seven pages, by thin slips of mahogany, which serve to open it easily at each of these divisions. Every one of these seven divisions contains seven pages, and each page contains forty-nine words.

No more than forty-nine words are contained in a page, because the numbers 8 and 9 and zero are omitted. This omission arises from the structure of the machinery, which points only to seven numbers, reserving 0 for a point of rest, at which point the hands indicate nothing. In every hundred therefore only forty-nine numbers are used; and in every thousand only seven hundred is counted. Each division of the book separated by the mahogany rulers contains all the efficient numbers in seven hundred. Each of these rulers projects
(Plate

(Plate II. Fig. 3.) beyond the fides of the pages, and each is numbered in fucceffion from one to feven, and they are fo placed below one another as to permit the numbers on all of them to be feen at once, as in Plate I.

WHEN any number of thoufands is pointed out it can by means of thefe rulers be immediately felected; the ferief of feven pages, which one of thefe rulers opens, is cut like the alphabet of a ledger at the edge, in feven divifions. By thefe means the page containing the hundred which is wanted is inftantly found. In the page thus found the tens from ten to feventy inclusive are divided from each other, fo as to be inftantly diftinguifhable, and the units under each divifion are in like manner eafily felected.

PLATE III. is a fpecimen of the firft page of the vocabulary, and though it is but one-fifth of the real fize it is fufficiently diftinct. It is divided into eight claffes; all the claffes are numbered downwards feriatim from 1 to 77, omitting cyphers or zero and eights and nines. When once the clafs required is afcertained any number on the page can be found immediately:—As for inftance, the reader will eafily felect Clafs IV. Number 36, or Clafs VII. Number 77, and fo of the reft.

NOTHING remains to be explained but the manner in which the clafs in each page is pointed out by the machinery. For
this

this purpose, before the pointers are turned to any set of figures, the pointer that represents thousands is turned to the class that is wanted; as soon as the correspondent answers this signal THOUSANDS is returned to O, and instantly all the pointers are moved to the places which denote the figures required for any word or sentence.

WHEN the class is thus ascertained, an index, which slides on the mahogany cover of the book, is set to the column belonging to this class; the number of thousands is then opened by the ruler as soon as it is read off by the telescope. The number of hundreds is opened by the pages where they are cut away, and the number of tens and units is seen on the page. As the pointers are moved in succession from thousands to units the different divisions of the book can be opened as fast as the pointers are moved. The order of this book might be reversed with apparent advantage, by dividing the book into classes by the mahogany rulers, &c. but I prefer, for reasons which it would be tedious to insist upon, the arrangement which I have followed.

As secrecy is an object of the greatest consequence, I shall endeavour to point out, in a few words, the superiority of this mode of communication over any alphabetical arrangement, not only in point of expedition but of concealment.

ALTHOUGH

ALTHOUGH the common alphabet may be varied at pleasure, and any arbitrary signs may be employed to convey the powers of each letter, yet by certain rules any of these arrangements may be decyphered. Whoever sees the movements of the French Telegraph (I mean of that which is commonly known as such) may unfold the intelligence which it conveys by merely marking down the changes which he sees, and putting them into the hands of a decypherer. The rules for decyphering depend upon the usual arrangements of letters. In our language a single letter must be *A* or *I*. The proportions which exist between words of one, two, three, and any greater number of letters, are classed in catalogues, and from these the monosyllables of any cypher are easily obtained; and from the letters of these monosyllables the letters of longer words are discovered. By similar rules, some of which are very ingenious, and which depend upon the general philosophy of language, any alphabetical cypher may be easily unfolded. But these rules, except a very few of them, are useless when we employ cyphers, which denote entire words. Here the most obvious means of discovery may be avoided, by omitting those common words which occur so frequently in every language, *the, and, that, to, &c.* But supposing that from its frequent recurrence any particular word should be discovered, no progress can be made from these data. The cypher of each word is an isolated fact, which leads to nothing farther. Suppose the knowledge of any particular vocabulary should fall into hands for which it was not intended, a slight change in the numeration, without any actual change
of

of the figures, would entirely prevent discovery:—For instance, if the Lord Lieutenant wished to send orders to the Commander in Chief, if he made use of the numbers written in the vocabulary on one day, he might, after previous communication, employ a different numeration, by ordering that 1 (for instance) should be added to every figure. If class II. Number 3664, stood in the vocabulary for gunpowder, by the addition which I have proposed the number would stand, Class III. Number 4775, which might mean a Crocodile or Tip-po-Saib, or any thing foreign to the real word. By similar provisions any number of separate correspondents might carry on a mutual intercourse without interfering with one another.

IN the course of twelve months I tried a great number of experiments, and carried on a great number of conversations with the Tellograph; of all these a regular journal has been kept, containing what was unsuccessful as well as what succeeded. If such journals were kept in the prosecution of philosophical pursuits, they would pay for the trouble of keeping them by the accuracy of the experience which they ensure.

I SHALL not at present enter into any detail of my nocturnal Tellograph. Its velocity far exceeds what can be done by day, as in clear weather stations at fifty miles distance may be plainly distinguished.

WHEN this Paper was first presented to the Academy I had determined to try an experiment across the channel from Donaghadee to Port Patrick. I was ambitious of being the first person who should connect the islands more closely by facilitating their mutual intercourse. Public business prevented me from going to the sea side at the time I had intended, and prevented me from carrying on a series of conversations by day and night between the two kingdoms; but Mr. Lovell Edgeworth, my son, had the satisfaction of sending four messages across the channel at four o'clock P. M. on the 24th of August 1795, and of receiving immediate answers, before a vast concourse of people. The machines by which this communication was made were thirty feet high, and fifteen feet at the base. A child of four years could turn them. Misty weather prevented them from being seen for two or three days; but when the weather cleared up a pointer of twelve feet high could have been plainly distinguished across the channel.

THOUGH I have bestowed much attention and labour upon this subject, I do not pretend to say that the means of Tellographic communication which I have invented are the best that can be devised. Imitations without end may be attempted; pointers of various shapes and materials may be employed; real improvements will also probably be made, and perhaps new principles may be adopted. The varieties of art are infinite, and none but persons of narrow understanding, who feel a want of resources in their own invention, are jealous of competition and
disposed

disposed to monopolise discoveries. The thing itself must sooner or later prevail, for utility convinces and governs mankind; and however inattention or timidity may for a time impede its progress, I will venture to predict that it will at some future period be generally practised, not only in these islands, but that it will in time become a means of communication between the most distant parts of the world, wherever arts and sciences have civilized mankind.

Specimen of the Vocabulary belonging

Common Words. Clafs o.	Words lefs common. Clafs 1.	Technical Terms, c.n.m. Clafs 2.	Perfons. Clafs 3.	Offices. Clafs 4.
1. 11 A 12 Ab 13 Ac 14 Ad 15 Æ 16 Af 17 Ag	1. 11 Abafe 12 Abate 13 Abbey 14 Abbefs 15 Abbot 16 Abdicate 17 Abed Abet	1. 11 Aback 12 Abacus 13 Abaft 14 Abatis 15 Abdomen 16 Abductor 17 Abeal	1. 11 Abbot 12 Ackland 13 Acton 14 Achefon 15 Adams 16 Adamfon 17 Adair	1. 11 Academy of Infcrip 12 Academy of B.L. I 13 Academy 14 Account Office 15 Admiralty 16 Agent to the — 17 Admiral
2. 21 Ah 22 Ai 23 Ak 24 Al 25 Am 26 An 27 Ap	2. 21 Abide 22 Abjure 23 Ablative 24 Ablebodied 25 Abolifhed 26 Abomination 27 Abortive	2. 21 Aberration 22 Abeyance 23 Ablution 24 Abortion 25 Abreast 26 Abrogation 27 Abcefs	2. 21 Adolphus 22 Addington 23 Ahmuty 24 Aikin 25 Alcock 26 Aldrige 27 Allot	2. 21 Adjutant 22 Alderman of Bristo 23 Alderman of Cork 24 Alderman of — 25 Archdeacon of — 26 — Ardagh 27 — Ardfer
3. 31 Aq 32 Ar 33 As 34 At 35 Av 36 Au 37 Aw	3. 31 Above-all 32 Above-board 33 Above-mentioned 34 Abridge 35 Abridgement 36 Abruptly 37 Abfentee	3. 31 Abeis 32 Abcenthium 33 Abforbent 34 Abfortion 35 Abftergent 36 Acacia 37 Ambrofe	3. 31 Alley 32 Allett 33 Allen 34 Alder 35 Alexander 36 Amyatt 37 Ambrofe	3. 31 — Armagh 32 — Aconry 33 — Aghadoe 34 — Clogher 35 — Clonfert 36 — Cloyne 37 — Connor

ecimen of the Vocabulary belonging to Mr. Edgworth's Tellogra

Technical Terms, c.n.m. Class 2.	Persons. Class 3.	Offices. Class 4.	Places. Class 5.	Navy and Merchant Ships. Class 6.	
1.	1.	1.	1.	1.	
Aback	11 Abbot	11 Academy of Inscriptions	11 Abbeville	11 Atlas	11 A
Abacus	12 Ackland	12 Academy of B.L. Paris	12 Aberdeen	12 Ajax	12 -
Abaft	13 Acton	13 Academy	13 Abergavenny	13 Albion	13 -
Abatis	14 Achefon	14 Account Office	14 Abington	14 Africa	14 -
Abdomen	15 Adams	15 Admiralty	15 Abidos	15 Audacious	15 -
Abductor	16 Adamson	16 Agent to the —	16 Abyssinia	16 Agamemnon	16 -
Abeal	17 Adair	17 Admiral	17 Acadia	17 America	17 -
2.	2.	2.	2.	2.	
Aberration	21 Adolphus	21 Adjutant	21 Acamboo	21 Anson	21 -
Abeyance	22 Addington	22 Alderman of Bristol	22 Acapulca	22 Alcide	22 -
Ablution	23 Ahmuty	23 Alderman of Cork	23 Acam	23 Alexander	23 -
Abortion	24 Aikin	24 Alderman of —	24 Adda	24 Alfred	24 -
Abreast	25 Alcock	25 Archdeacon of —	25 Adrianople	25 Arrogant	25 -
Abrogation	26 Aldrige	26 — Ardagh	26 Atna	26 Asia	26 -
Abcefs	27 Allot	27 — Ardferf	27 Africa	27 Ardent	27 -
3.	3.	3.	3.	3.	
Abeis	31 Alley	31 — Armagh	31 Agincourt	31 Achilles	31 -
Abcenthium	32 Allett	32 — Aconry	32 Aix la Chapelle	32 Adamant	32 -
Absorbent	33 Allen	33 — Aghadoe	33 Albany	33 Assistance	33 -
Abortion	34 Alder	34 — Clogher	34 Alcantara	34 Acteon	34 -
Abftergent	35 Alexander	35 — Clonfert	35 Aleppo	35 Argo	35 -
Acacia	36 Amyatt	36 — Cloyne	36 Alexandria	36 Artois	36 -
Academic	37 Ambrose	37 — Connor	37 Albion	37 Argonne	37 -

ng to Mr. Edgworth's Tellograph.

	Places. Class 5.	Navy and Merchant Ships. Class 6.	Phrases and Sentences. Class 7.	
	I.	I.	I.	Hundred O.
otions Paris	11 Abbeville 12 Aberdeen 13 Abergavenny 14 Abington 15 Abidos 16 Abyffinia 17 Acadia	11 Atlas 12 Ajax 13 Albion 14 Africa 15 Audacious 16 Agamemnon 17 America	11 Attend to-day at A. M. 12 _____ at P. M. 13 _____ to-morrow at A. M. 14 _____ at P. M. 15 _____ to-night at _____ 16 _____ to-morrow night at _____ 17 _____ on Monday at A. M.	
	2.	2.	2.	
l	21 Acamboo 22 Acapulca 23 Acam 24 Adda 25 Adrianople 26 Ætna 27 Africa	21 Anfon 22 Alcide 23 Alexander 24 Alfred 25 Arrogant 26 Asia 27 Ardent	21 _____ at P. M. 22 _____ on Tuefday at A. M. 23 _____ at P. M. 24 _____ on Wednefday at A. M. 25 _____ at P. M. 26 _____ on Thursday at A. M. 27 _____ at P. M.	
—	3.	3.	3.	
	31 Agincourt 32 Aix la Chapelle 33 Albany 34 Alcantara 35 Aleppo 36 Alexandria 37 Alejo	31 Achilles 32 Adamant 33 Affiftance 34 Acteon 35 Argo 36 Artois 37 Artois	31 _____ on Friday at A. M. 32 _____ at P. M. 33 _____ on Saturday at A. M. 34 _____ at P. M. 35 Alarming intelligence is received from _____ 36 _____	

2.
21 Ah
22 Ai
23 Ak
24 Al
25 Am
26 An
27 Ap

3.
31 Aq
32 Ar
33 As
34 At
35 Av
36 Au
37 Aw

4.
41 Ay
42 Ax
43 Az
44 Abandon
45 Abuse
46 Abhor
47 Abjeſt

5.
51 Ability
52 Able
53 Above
54 Abound
55 About
56 Abundance
57 Abroad

6.

Abet
2.
21 Abide
22 Abjure
23 Ablative
24 Ablebodied
25 Aboliſhed
26 Abomination
27 Abortive

3.
31 Above-all
32 Above-board
33 Above-mentioned
34 Abridge
35 Abridgement
36 Abruptly
37 Abſentee

4.
41 Abſolve
42 Abſolution
43 Abſorb
44 Abſtraſt
45 Abſtruſe
46 Abſurdly
47 Abyſs

5.
51 Academy
52 Accelerate
53 Accent
54 Acceſs
55 Acceſſory
56 Acceſſible
57 Acclamation

6.

Abear
2.
21 Aberration
22 Abeyance
23 Ablution
24 Abortion
25 Abreaſt
26 Abrogation
27 Abſeſs

3.
31 Abeis
32 Abcenthium
33 Abſorbent
34 Abſortion
35 Abſtergent
36 Acacia
37 Academic

4.
41 Acantha
42 Accretion
43 Aceſcent
44 Acetous
45 Achromatic
46 Acids
47 Acidity

5.
51 Acme
52 Aconite
53 Acouſtics
54 Acroſtic
55 Adamant
56 Adder
57 Adder's-tongue

6.

Adan
2.
21 Adolphus
22 Addington
23 Ahmuty
24 Aikin
25 Alcock
26 Aldrige
27 Allot

3.
31 Alley
32 Allett
33 Allen
34 Alder
35 Alexander
36 Amyatt
37 Ambroſe

4.
41 Anderſon
42 Andoe
43 Addreſs
44 Angel
45 Anger
46 Anneſly
47 Anneſdale

5.
51 Antrim
52 Anſon
53 Anſruther
54 Antonie
55 Anthony
56 Alfred
57 Alphonſus

6.

Admiral
2.
21 Adjutant
22 Alderman of Briſto
23 Alderman of Cork
24 Alderman of —
25 Archdeacon of —
26 — Ardagh
27 — Ardſert

3.
31 — Armagh
32 — Aconry
33 — Aghadoe
34 — Clogher
35 — Clonfert
36 — Cloyne
37 — Connor

4.
41 — Dublin
42 Archbiſhop of
43 — Dublin
44 — Armagh
45 — Caſhel
46 — Cork
47 — Canterbury

5.
51 — Tuam
52 — York
53 Admiral of
54 — the Fleet
55 — the White
56 — ditto, 1
57 — ditto, 2

6.

Abbeal	17 Adair	17 Admiral	17 Acadia	17 America	17 —
2.	2.	2.	2.	2.	
Aberration	21 Adolphus	21 Adjutant	21 Acambo	21 Anfon	21 —
Abeyance	22 Addington	22 Alderman of Bristol	22 Acapulca	22 Alcide	22 —
Ablution	23 Ahmuty	23 Alderman of Cork	23 Acam	23 Alexander	23 —
Abortion	24 Aikin	24 Alderman of —	24 Adda	24 Alfred	24 —
Abreast	25 Alcock	25 Archdeacon of —	25 Adrianople	25 Arrogant	25 —
Abrogation	26 Aldrige	26 — Ardagh	26 Ætna	26 Asia	26 —
Abcefs	27 Allot	27 — Ardfert	27 Africa	27 Ardent	27 —
3.	3.	3.	3.	3.	
Abeis	31 Alley	31 — Armagh	31 Agincourt	31 Achilles	31 —
Abcenthium	32 Allett	32 — Aconry	32 Aix la Chapelle	32 Adamant	32 —
Abforbent	33 Allen	33 — Aghadoe	33 Albany	33 Affiftance	33 —
Abfortion	34 Alder	34 — Clogher	34 Alcantara	34 Afteton	34 —
Abftergent	35 Alexander	35 — Clonfert	35 Aleppo	35 Argo	35 Al
Acacia	36 Amyatt	36 — Cloyne	36 Alexandria	36 Artois	36 —
Academic	37 Ambrofe	37 — Connor	37 Algiers	37 Affurance	37 Ac
4.	4.	4.	4.	4.	
Acantha	41 Anderfon	41 — Dublin	41 Alicant	41 Arethufa	41 —
Accretion	42 Andoe	42 Archbishop of	42 Alps	42 Æolus	42 —
Acefcent	43 Andrews	43 — Dublin	43 Alfice	43 Active	43 —
Acetous	44 Angel	44 — Armagh	44 Antrim	44 Alarm	44 —
Achromatic	45 Anger	45 — Caffel	45 Aylfbury	45 Amazon	45 Ag
Acids	46 Annefly	46 — Cork	46 Ayrshire	46 Ambufcade	46 —
Acidity	47 Annefdale	47 — Canterbury	47 Allfaints	47 Amphion	47 —
5.	5.	5.	5.	5.	
Acme	51 Antrim	51 — Tuam	51 Alnwick	51 Apollo	51 —
Aconite	52 Anfon	52 — York	52 Aloft	52 Aftrea	52 —
Acouftics	53 Anfturth	53 Admiral of	53 Alersford	53 Alcmena	53 —
Acroftic	54 Antonie	54 — the Fleet	54 Aldborough	54 Andromache	54 Ag
Adamant	55 Anthony	55 — the White	55 Alencon	55 Albemarle	55 Al
Adder	56 Alfred	56 — ditto, 1	56 Andes	56 Aurora	56 Al
Adder's-tongue	57 Alphonfus	57 — ditto, 2	57 Anglefey	57 Amphitrite	57 —
6.	6.	6.	6.	6.	

16 Abythia
17 Acadia

2.

21 Acamboo
22 Acapulca
23 Acam
24 Adda
25 Adrianople
26 Ætna
27 Africa

3.

31 Agincourt
32 Aix la Chapelle
33 Albany
34 Alcantara
35 Aleppo
36 Alexandria
37 Algiers

4.

41 Alicant
42 Alps
43 Alface
44 Antrim
45 Aylsbury
46 Ayrshire
47 Allsaints

5.

51 Alnwick
52 Aloft
53 Alersford
54 Aldborough
55 Alencon
56 Andes
57 Anglesey

16 Agamemnon
17 America

2.

21 Anfon
22 Alcide
23 Alexander
24 Alfred
25 Arrogant
26 Asia
27 Ardent

3.

31 Achilles
32 Adamant
33 Assistance
34 Acteon
35 Argo
36 Artois
37 Assurance

4.

41 Arethusa
42 Æolus
43 Active
44 Alarm
45 Amazon
46 Ambuscade
47 Amphion

5.

51 Apollo
52 Aftrea
53 Alcmene
54 Andromache
55 Albemarle
56 Aurora
57 Amphitrite

16 ——— to-morrow night at ———
17 ——— on Monday at A. M.

2.

21 ——— at P. M.
22 ——— on Tuesday at A. M.
23 ——— at P. M.
24 ——— on Wednesday at A. M.
25 ——— at P. M.
26 ——— on Thursday at A. M.
27 ——— at P. M.

3.

31 ——— on Friday at A. M.
32 ——— at P. M.
33 ——— on Saturday at A. M.
34 ——— at P. M.
35 Alarming intelligence is received
from ———
37 Acquaint the Commissioner's Officer at —

4.

41 ——— the principal Magistrates at ———
42 ——— the H. Sheriff ———
43 ——— the Secretary of War
44 ——— of State
45 Agreeably to the orders of his
Majesty
47 ——— of the Ld. Lieutenant

5.

51 ——— of Government
52 ——— of the Commanding Officer at ———
53 ——— of the Magistrate of ———
54 Agreeably to your orders
55 All is well
56 Alter your Tellographs to black
57 ——— to white

37	41	42	43	44	45	46	47	51	52	53	54	55	56	57	61	62	63	64	65	66	67	71	72	73	74	75	76	77
11	Ay	Ax	Az	Abandon	Abuse	Abhor	Abjeſt	Ability	Able	Above	Abound	About	Abundance	Abroad	Abrupt	Absent	Absence	Absolute	Abstain	Absurd	Abstain	Abuse	Accede	Accept	Acceptable	Accident	Accompany	Accompliſh
4								5							6							7						
	41	42	43	44	45	46	47	51	52	53	54	55	56	57	61	62	63	64	65	66	67	71	72	73	74	75	76	77
	Abſolve	Abſolution	Abſorb	Abſtract	Abſtruſe	Abſurdly	Abyſs	Academy	Accelerate	Accent	Accels	Accellory	Accellible	Acclamation	Accommodate	Accomplice	Accoſt	Accountant	Account book	Accretion	Accrue	Accumulate	Accuſative	Ace	Achieve	Acquiſition	Acquittance	Acre
	4							5							6							7						
	41	42	43	44	45	46	47	51	52	53	54	55	56	57	61	62	63	64	65	66	67	71	72	73	74	75	76	77
	Acantha	Accretion	Aceſcent	Acetous	Achromatic	Acids	Acidity	Acme	Aconite	Acouſtics	Acroſtic	Adamant	Adder	Adder's-tongue	Adductor	Adelphi	Ades	Adit	Adjutant	Adnata	Adonis	Adofcalation	Adracanth	Adrift	Advance-foſſe	Advance-guard	Advancement	Advertiſement
	4							5							6							7						
	41	42	43	44	45	46	47	51	52	53	54	55	56	57	61	62	63	64	65	66	67	71	72	73	74	75	76	77
	Anderſon	Andoe	Andrews	Angel	Anger	Anneſſy	Anneſdale	Antrim	Anſon	Anſtruther	Antonie	Anthony	Alfred	Alphonſus	Amadeus	Anne	Anſolm	Appleby	Apſley	Archer	Auſtin	Archdale	Arran, Ld.	Archdall	Aſhe	Atkinſon	Aylward	Ayre
	4							5							6							7						
	41	42	43	44	45	46	47	51	52	53	54	55	56	57	61	62	63	64	65	66	67	71	72	73	74	75	76	77
	— Dublin	Archbiſhop of	— Dublin	— Armagh	— Caſhel	— Cork	— Canterbury	— Tuam	— York	Admiral of	— the Fleet	— the White	— ditto, 1	— ditto, 2	— ditto, 3	— ditto, 4	— ditto, 5	— ditto, 6	— ditto, 7	— ditto, 8	— ditto, 9	— ditto, 10	— ditto, 11	Admiral of	— the Blue	— ditto, 1	— ditto, 2	— ditto, 3

Academy	37 Ambrose	37 — Connor	37 Aigiers	37 Anurance	37 —
4.	4.	4.	4.	4.	
Acantha	41 Anderfon	41 — Dublin	41 Alicant	41 Arethufa	41 —
Accretion	42 Andoe	42 Archbishop of	42 Alps	42 Æolus	42 —
Acefcnt	43 Addreus	43 — Dublin	43 Alface	43 Active	43 —
Acetous	44 Angel	44 — Armagh	44 Antrim	44 Alarm	44 —
Achromatic	45 Anger	45 — Cafhcl	45 Aylfbury	45 Amazon	45 A
Acids	46 Annefly	46 — Cork	46 Ayrshire	46 Ambufcade	
Acidity	47 Annefdale	47 — Canterbury	47 Allfaints	47 Amphion	47 —
5.	5.	5.	5.	5.	
Acme	51 Antrim	51 — Tuam	51 Alnwick	51 Apollo	51 —
Aconite	52 Anfon	52 — York	52 Aloft	52 Aftrea	52 —
Acouftics	53 Anfturthcr	53 Admiral of	53 Alersford	53 Alcmena	53 —
Acroftic	54 Antonie	54 — the Fleet	54 Aldborough	54 Andromache	54 A
Adamant	55 Anthony	55 — the White	55 Alencon	55 Albemarle	55 A
Adder	56 Alfred	56 — ditto, 1	56 Andes	56 Aurora	56 A
Adder's-tongue	57 Alphonfus	57 — ditto, 2	57 Anglefey	57 Amphitrite	57 —
6.	6.	6.	6.	6.	
Adductor	61 Amadeus	61 — ditto, 3	61 Angola	61 Ariadne	61 A
Adelphi	62 Anne	62 — ditto, 4	62 Anjou	62 Alfred	62 A
Ades	63 Anfolm	63 — ditto, 5	63 Anhalt	63 Atalanta	63 A
Adit	64 Appleby	64 — ditto, 6	64 Antioch	64 Ariel	64 A
Adjutant	65 Apfley	65 — ditto, 7	65 Antwerp	65 Allegiance	65 A
Adnata	66 Archer	66 — ditto, 8	66 Archangel	66 Albany	66 A
Adonis	67 Auftin	67 — ditto, 9	67 Argenton	67 Alderney	67 A
7.	7.	7.	7.	7.	
Adofcalation	71 Archdale	71 — ditto, 10	71 Atherftone	71 Alert	71 A
Adracanth	72 Arran, Ld.	72 — ditto, 11	72 Ardee	72 Alligator	72 A
Adrift	73 Archdall	73 Admiral of	73 Arklow	73 Avenger	73 A
Advance-foffe	74 Afhe	74 — the Blue	74 Armagh	74 Ætna	74 A
Advance-guard	75 Atkinfon	75 — ditto, 1	75 Athenry	75 Alefto	75 A
Advancement	76 Aylward	76 — ditto, 2	76 Athlone	76 Aquilone	76 A
Advertisment	77 Ayre	77 — ditto, 3	77 Athy	77 Argus	77 A

37 Anglers

4.

41 Alicant
42 Alps
43 Alfice
44 Antrim
45 Aylsbury
46 Ayrshire
47 Allsaints

5.

51 Alnwick
52 Aloft
53 Alersford
54 Aldborough
55 Alencon
56 Andes
57 Anglesey

6.

61 Angola
62 Anjou
63 Anhalt
64 Antioch
65 Antwerp
66 Archangel
67 Argenton

7.

71 Atherstone
72 Ardee
73 Arklow
74 Armagh
75 Athenry
76 Athlone
77 Athy

37 Assurance

4.

41 Arethusa
42 Æolus
43 Active
44 Alarm
45 Amazon
46 Ambuscade
47 Amphion

5.

51 Apollo
52 Aftrea
53 Alcmena
54 Andromache
55 Albemarle
56 Aurora
57 Amphitrite

6.

61 Ariadne
62 Alfred
63 Atalanta
64 Ariel
65 Allegiance
66 Albany
67 Alderney

7.

71 Alert
72 Alligator
73 Avenger
74 Ætna
75 Aleto
76 Aquilone
77 Argus

37 Acquaint the Commissioner's Officer at —

4.

41 ——— the principal Magistrates at —
42 ——— the H. Sheriff —
43 ——— the Secretary of War
44 ——— of State
45 Agreeably to the orders of his
Majesty
47 ——— of the Ld. Lieutenant

5.

51 ——— of Government
52 ——— of the Commanding Officer at —
53 ——— of the Magistrate of —
54 Agreeably to your orders
55 All is well
56 Alter your Tellographs to black
57 ——— to white

6.

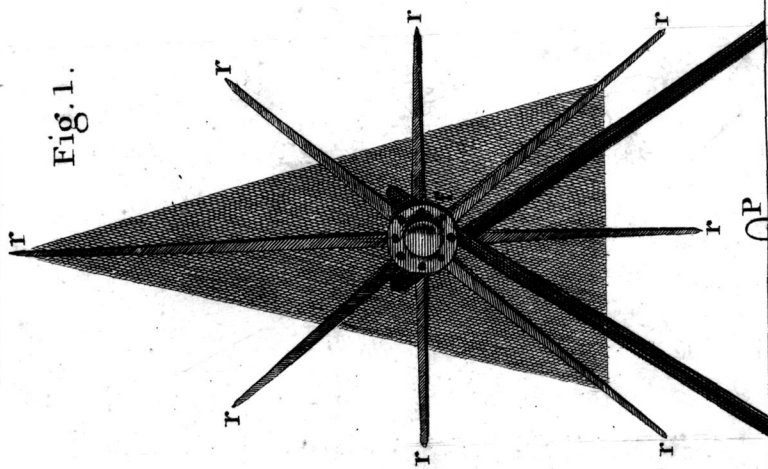
61 Admit no Strangers
62 Admiralty has issued Orders
63 Admiralty has received Intelligence
64 Arms have been found hidden at —
65 An Army approaches, in number —
66 An armed Mob —
67 Articles of Capitulation agreed to

7.

71 Assistance is required at —
72 Appearances are against —
73 Answer my last to-morrow
74 Arrived since my last at —
75 Arrived news from E. Indies
76 Arrived Mails from —
77 Agreeable intelligence is received

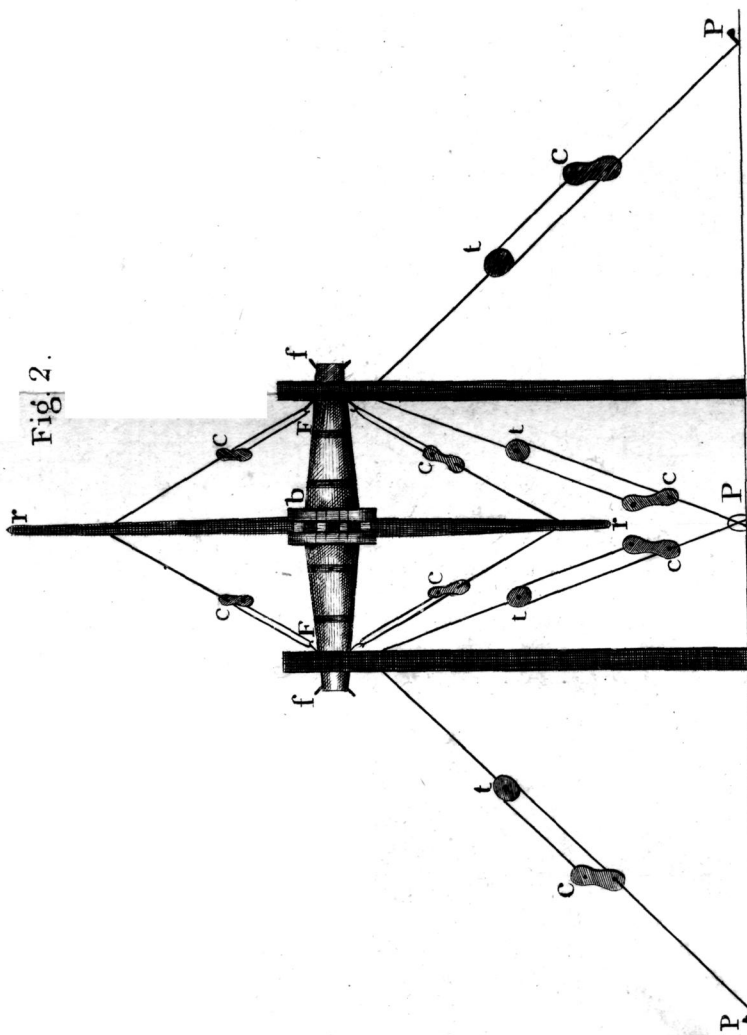
Front Elevation

Fig. 1.



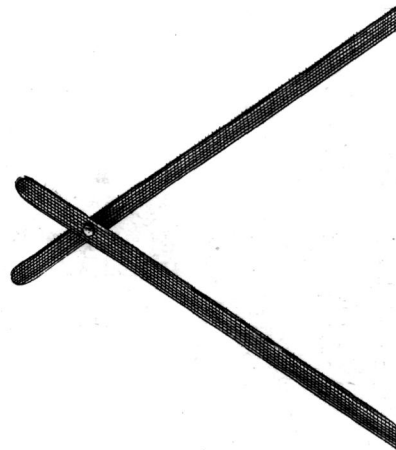
Profile

Fig. 2.



Stand

Fig. 3.



Axletree Fig. 4.



Fig. 5.

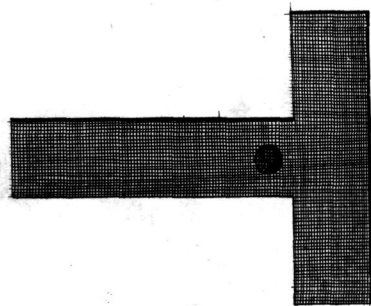


Fig. 6.
Holder



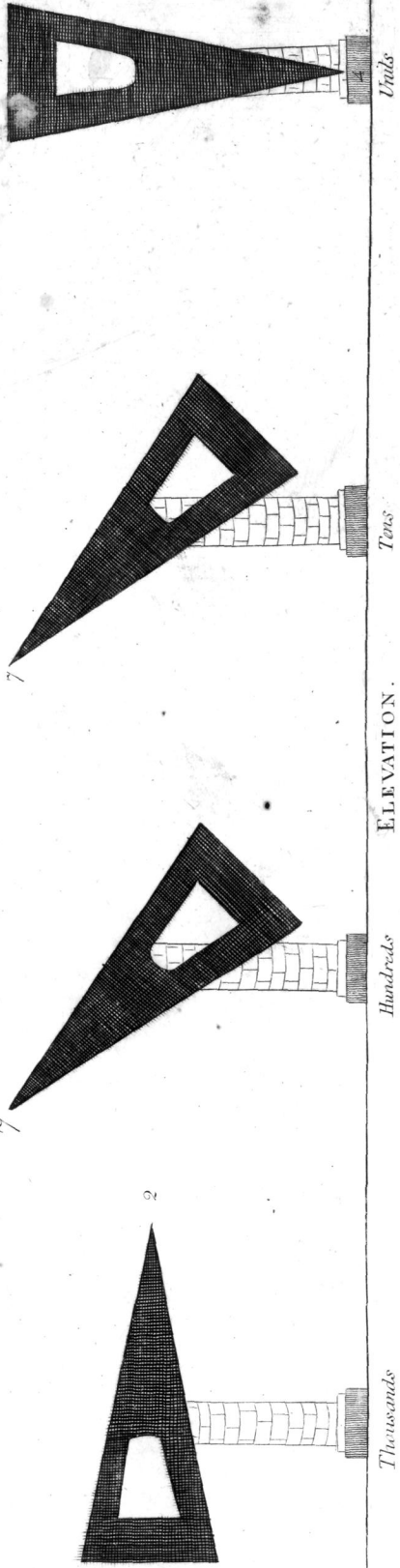
Fig. 7.
Flanch



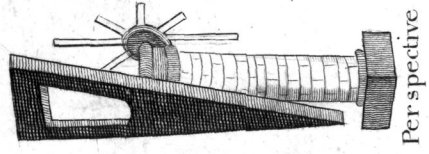
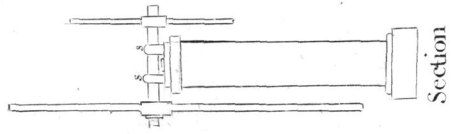
Fig. 8.



Index of a different Form

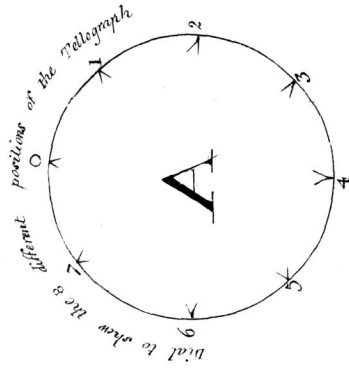
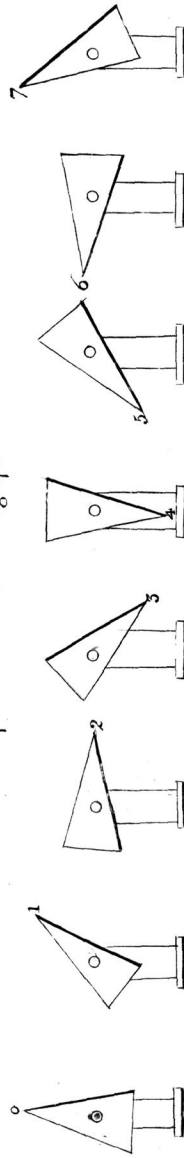


ELEVATION.



Scale of Fifty Feet

Fig. 1.
View of the 8 different positions of the Tellograph



Example of a line of Six words described by the Tellograph

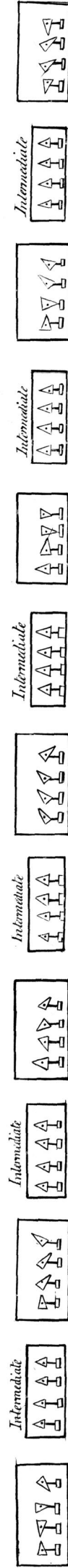


Fig. 4.

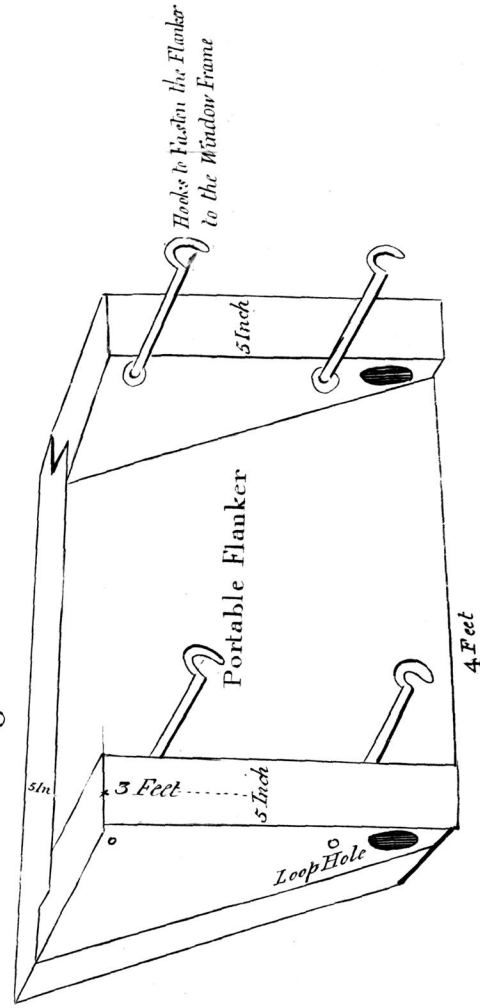


Fig. 5.

